PATENT COOPERATION TREATY

TRANSLATION

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

	Date of mailing *(day/month/year)*
Applicant's or agent's file reference IP050101T	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/JP2005/000264	13.01.2005	20.01.2004

International Patent Classification (IPC) or both national classification and IPC

Applicant
FUJIKIN INCORPORATED

1. This opinion contains indications relating to the following items:

☒	Box No. I	Basis of the opinion
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☒	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/JP Facsimile No.	Authorized officer Telephone No.

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Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This opinion has been established on the basis of a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of international search (under Rule 12.3 and 23.1(b)).

2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

☐ a sequence listing

☐ table(s) related to the sequence listing

b. format of material

☐ in written format

☐ in computer readable form

c. time of filing/furnishing

☐ contained in the international application as filed.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

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Box No. IV Lack of unity of invention

1. ☐ In response to the invitation (Form PCT/ISA/206) to pay additional fees the applicant has:

   ☒ paid additional fees

   ☐ paid additional fees under protest

   ☐ not paid additional fees

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

   ☐ complied with

   ☒ not complied with for the following reasons:

The subject matters of claims 1-3, 13 and 14 are considered to be an invention relating to an apparatus and method for opening a fluid passage by an actuator operated valve installed between fluid passages almost constant in the inner pressure of the pipelines, in which (1) at first the drive input to the said actuator is increased or decreased to a predetermined set value for moving the valve body in the valve opening direction, and (2) after holding the drive input to the actuator at the said set value for a short time, the said drive input is further increased or decreased to fully open the valve, so that the fluid passage can be quickly opened in a very short time (for example, 300 to 1000 msec) without water hammering.

On the contrary, the subject matters of claims 4-12 are considered to be an invention, in which (1) a vibration sensor is detachably attached to a pipeline, and (2) the vibration detection signal Pr detected by the vibration sensor is fed back to an arithmetic and control unit 16, for controlling the actuator operation pressure Pa applied to the actuator 11 of the valve body through an electropneumatic conversion controller,

so that (a) the valve opening without water hammering can be achieved even if the valve body is not provided with a stroke position detector or even if any pressure detector is not kept attached to pipeline L1, and (b) if the optimum condition for allowing valve opening without water hammering (namely, the condition for controlling the actuator operation pressure Pa) is obtained for the pipeline L1 concerned, the vibrator sensor 18 and the arithmetic and control unit can be removed and applied to another pipeline to exhibit an economically advantageous working effect.

So, since the subject matters of claims 4-12 are considered to be an invention apparently different in technical feature compared with the subject matters of claims 1-3, 13 and 14, it is evident that claims 1-14 do not satisfy the requirement of unity of invention.

4. Consequently, this opinion has been established in respect of the following parts of the international application:

   ☒ all parts

   ☐ the parts relating to claims Nos. _____

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Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	4-12	YES
	Claims	1-3, 13, 14	NO
Inventive step (IS)	Claims	4-12	YES
	Claims	1-3, 13, 14	NO
Industrial applicability (IA)	Claims	1-14	YES
	Claims		NO

2. Citations and explanations:

[List of documents]
Document 1: JP, 2000-74254, A (K.K. Benkan, presently named Benex Corp., et al.), 14 March, 2000 (14.03.00), full text, Figs. 1-10

Document 2: JP, 9-502292, A (Rosemount Inc.), 4 March, 1997 (04.03.97), full text, Figs. 1-9

Document 3: JP, 63-115208, A (Toshiba Corp.), 19 May, 1988 (19.05.88), full text, Figs. 1-5

Claims 1-3

Document 1 describes a method for opening a fluid passage without water hammering for preventing the occurrence of water hammering, in which an actuator operated valve (1) installed between fluid passages (11a and 11b) almost constant in the inner pressure of the pipelines is used to open a liquid passage for supplying a fluid to the downstream fluid passage (11b), comprising the steps of increasing or decreasing the drive input to the actuator (cylinder 2) to a predetermined set value, for moving the valve body in the valve opening direction (Fig. 5), holding the drive input to the actuator at the said set value for a short time, and subsequently further increasing or decreasing the said drive input, to fully open the valve.

Furthermore, document 1 describes a normally closed pneumatic pressure operated diaphragm valve (1) normally closed by a spring (5).

Moreover, selecting one second or less as the short time during which the drive input is held at the set value and selecting 10% or less of the pressure value prevailing before valve opening as the pressure rise value of the fluid passage in the opening method of document 1 are considered to be mere restriction of design values a person skilled in the art could have decided as required.

So, the subject matters of claims 1-3 of the present application do not appear to be novel or to involve an inventive step.

Claims 4-12

Documents 1-3 are reference documents showing the general state of the art in the technical field concerned.

None of the documents cited in the ISR describes or suggests the following apparatuses.

(A) An apparatus for opening a fluid passage without water hammering, comprising (1) a valve body, (2) an actuator for driving the valve body, (3) a vibration sensor detachably fixed to the pipeline upstream of the valve, (4) an electropneumatic conversion controller (a) for receiving a valve open/close command signal applied to it, and (b) for controlling the actuator operation pressure Pa applied to the actuator by the control signal Sc pre-stored in its data storage section, and (4) an arithmetic and control unit (I) provided with a comparison operation circuit (a) for receiving (i) a vibration detection signal Pr from the said vibration sensor, (ii) a step pressure setting signal Ps fed

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

to the actuator, (iii) a holding time setting signal Ts for the step pressure, and (iv) an allowable upper limit vibration pressure setting signal Prm, respectively applied to it, and (b) for comparing the said vibration detection signal Pr and the said allowable upper limit vibration pressure setting signal Prm, to correct the said step pressure setting signal Ps, and (II) for delivering a control signal Sc consisting of the said holding time setting signal Ts and the corrected step pressure setting signal Ps to the said data storage section of the electropneumatic conversion controller.

(B) An apparatus for opening a fluid passage without water hammering, comprising (1) an actuator operated valve installed between fluid passages, (2) an electropneumatic converter for feeding a two-stage actuator operation pressure Pa to the actuator operated valve, (3) a vibration sensor detachably fixed to the pipeline upstream of the said actuator operated valve, and (4) a tuning box (a) for receiving the vibration detection signal Pr detected by the vibration sensor and applied to it, (b) for delivering a control signal Sc for controlling the magnitude of the step operation pressure Ps' of the said two-stage actuator operation pressure Pa to the electropneumatic converter, and (c) for adjusting the said control signal Sc, to let the electropneumatic converter deliver the two-stage actuator operation pressure Pa of the step operation pressure Ps', to ensure that the vibration detection signal Pr may become almost zero.

Claims 13 and 14

Document 1 describes an opening method free from water hammering, in which a chemical liquid is used as the fluid.

So, the subject matters of claims 13 and 14 of the present application do not appear to be novel or to involve an inventive step.